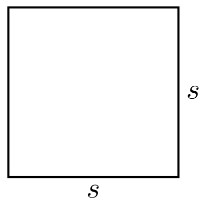
2D GEOMETRY FORMULAS

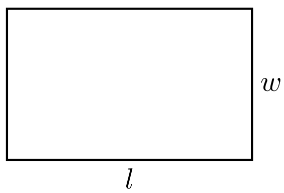
SQUARE

s = side
Area: $A = s^2$
Perimeter: $P = 4s$



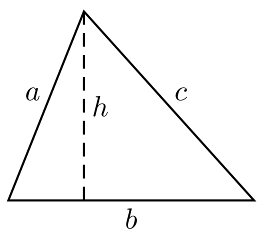
RECTANGLE

l = length, w = width
Area: $A = lw$
Perimeter: $P = 2l + 2w$



TRIANGLE

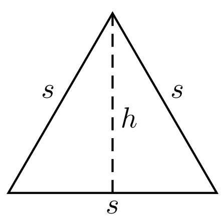
b = base, h = height
Area: $A = \frac{1}{2}bh$
Perimeter: $P = a + b + c$



EQUILATERAL TRIANGLE

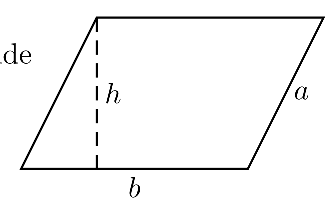
s = side
Height: $h = \frac{\sqrt{3}}{2}s$

Area: $A = \frac{\sqrt{3}}{4}s^2$



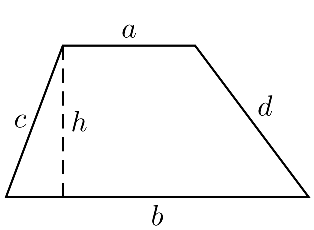
PARALLELOGRAM

b = base, h = height, a = side
Area: $A = bh$
Perimeter: $P = 2a + 2b$



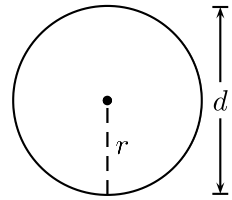
TRAPEZOID

a, b = bases; h = height;
c, d = sides
Area: $A = \frac{1}{2}(a + b)h$
Perimeter:
$P = a + b + c + d$



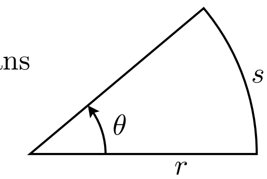
CIRCLE

r = radius, d = diameter
Diameter: $d = 2r$
Area: $A = \pi r^2$
Circumference: $C = 2\pi r = \pi d$



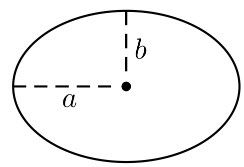
SECTOR OF CIRCLE

r = radius, θ = angle in radians
Area: $A = \frac{1}{2}\theta r^2$
Arc Length: $s = \theta r$



ELLIPSE

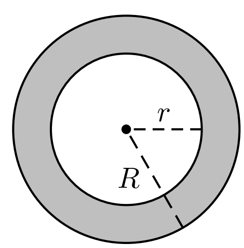
a = semimajor axis
b = semiminor axis
Area: $A = \pi ab$



Circumference:
$C \approx \pi \left(3(a + b) - \sqrt{(a + 3b)(b + 3a)}\right)$

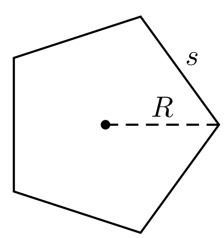
ANNULUS

r = inner radius,
R = outer radius
Average Radius: $\rho = \frac{1}{2}(r + R)$
Width: $w = R - r$
Area: $A = \pi(R^2 - r^2)$
or $A = 2\pi\rho w$



REGULAR POLYGON

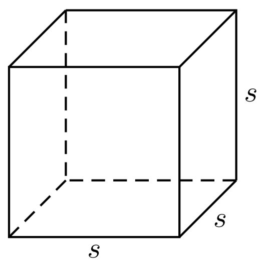
s = side length,
n = number of sides
Circumradius: $R = \frac{1}{2}s\csc(\frac{\pi}{n})$
Area: $A = \frac{1}{4}ns^2\cot(\frac{\pi}{n})$
or $A = \frac{1}{2}nR^2\sin(\frac{2\pi}{n})$



3D GEOMETRY FORMULAS

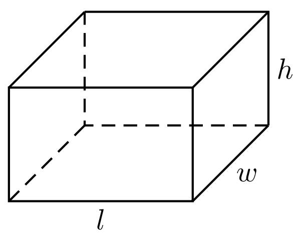
CUBE

s = side
Volume: $V = s^3$
Surface Area: $S = 6s^2$



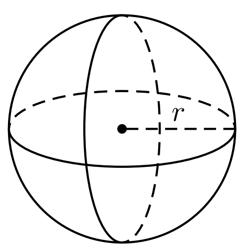
RECTANGULAR SOLID

l = length, w = width,
h = height
Volume: $V = lwh$
Surface Area:
$S = 2lw + 2lh + 2wh$



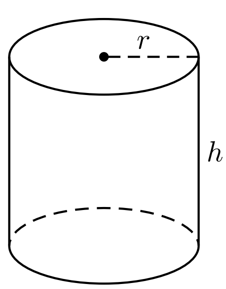
SPHERE

r = radius
Volume: $V = \frac{4}{3}\pi r^3$
Surface Area: $S = 4\pi r^2$



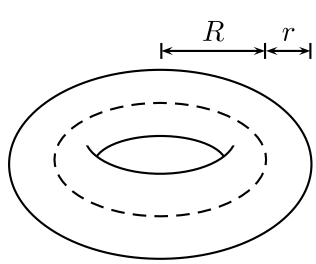
RIGHT CIRCULAR CYLINDER

r = radius, h = height
Volume: $V = \pi r^2 h$
Surface Area: $S = 2\pi rh + 2\pi r^2$



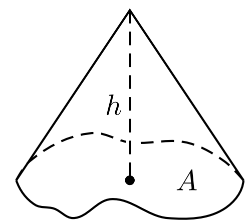
TORUS

r = tube radius,
R = torus radius
Volume: $V = 2\pi^2 r^2 R$
Surface Area: $S = 4\pi^2 rR$



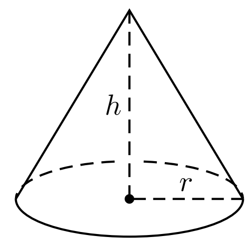
GENERAL CONE OR PYRAMID

A = area of base, h = height
Volume: $V = \frac{1}{3}Ah$



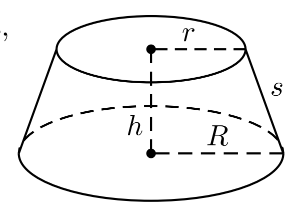
RIGHT CIRCULAR CONE

r = radius, h = height
Volume: $V = \frac{1}{3}\pi r^2 h$
Surface Area:
$S = \pi r\sqrt{r^2 + h^2} + \pi r^2$



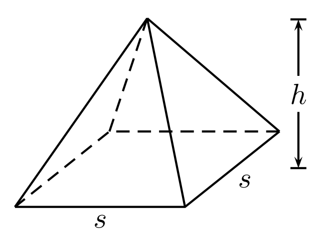
FRUSTUM OF A CONE

r = top radius, R = base radius,
h = height, s = slant height
Volume: $V = \frac{\pi}{3}(r^2 + rR + R^2)h$
Surface Area:
$S = \pi s(R + r) + \pi r^2 + \pi R^2$



SQUARE PYRAMID

s = side, h = height
Volume: $V = \frac{1}{3}s^2 h$
Surface Area:
$S = s(s + \sqrt{s^2 + 4h^2})$



REGULAR TETRAHEDRON

s = side
Volume: $V = \frac{1}{12}\sqrt{2}s^3$
Surface Area: $S = \sqrt{3}s^2$

